Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

REVIEWS

Geology of the Little Belt Mountains, Montana, with notes on the Mineral Deposits of the Neihart, Barker, Yogo, and other Districts, by WALTER HARVEY WEED, accompanied by a report on *The Petrography of the Igneous Rocks of the District*, by L. V. PIRSSON. Twentieth Annual Report of the U. S. Geological Survey, Washington, 1900. Pp. 257–581, with 42 plates and 43 figures.

This voluminous report is based upon field work done in September 1893, and August 1894. The major part of the report was written by Mr. Weed, who describes the position, topography, and geological structure of the region. The rock formations are described in succession from the gneisses, schists, and Algonkian series, through Cambrian and Siluro-Devonian to Carboniferous. The geology of the region is treated in detail, commencing with the southern part of the range, and followed by Judith area, the Yogo, Big Baldy Mountain, Wolf Butte, Taylor Peak, Barker, and Monarch districts, and finally the Neihart.

A chapter is devoted to the general geology, and deals first with the history of the region as interpreted from sedimentary rocks, showing that the same general conditions prevailed in this region as in the rest of the eastern part of the Rocky Mountain area of the state. The uplift of the Little Belt Mountain range is supposed to have been due to lateral compression, but the minor doming and faulting observed at all the larger mountain masses are due to igneous intrusions.

With the exception of Yogo Peak all the prominent mountain masses are formed of igneous rock, whose structural features show that they constitute a group of closely related forms, grading from typical laccoliths to those of plutonic plugs or bysmaliths. The largest of these bodies is exposed over an area of three by five miles, and is probably 3009 feet thick. With these are associated numerous intrusive sheets, but few dikes. There are besides several intrusive rocks not directly connected with the laccolithic bodies. The character and origin of these intrusions are discussed.

The concluding chapter of Mr. Weed's report contains notes on the ore deposits, under the heading : " The Ores, Veins, and Mines." The ores are chiefly those of silver, silver-lead, and gold. Sapphire mines occur in Fergus county, and are said to be the most valuable gem mines in the country. Deposits of limonite and hematite are found in a number of localities and will some day be developed economically.

The petrography of the igneous rocks by Professor Pirsson is a rather full account of the rocks, their mode of occurrence and field relations, texture, and microscopical characters, together with their chemical composition and the estimated quantitative mineral composition. It also considers the general petrology of the region, and closes with a discussion of magmas by graphic methods, and the absorption of sediments by magmas.

The rocks are subdivided into (*a*) granular non-porphyritic rocks, (*b*) acid feldspathic porphyries, (*c*) lamprophyres, (*d*) effusive rocks. In the first group are found representatives of syenites, monzonites, diorites, shonkinites, and aplites. Among the syenites is analcite-(nephelite) syenite, which, unfortunately, has not been analyzed chemically. Syenite, monzonite, and shonkinite occur together as differentiation products of one rock body at Yogo Peak. In the shonkinite the proportion between the dark and the light constituents is $\frac{65}{35}$—that is, the former preponderate. The second group contain representatives of granite, syenite, and diorite classes, and constitute the laccoliths and many of the intruded sheets. Among these rocks there are many transitional types, the transitions being, in several cases, of much more importance locally than the more commonly-known types. Further, these transitions occur not only in different masses, but often in the same mass. The third group includes minettes, which are rather common in this district, besides nephelite-minette, vogesite, and analcite-basalts. Among the minettes is a variolitic facies, the small varioles being spherulites of feldspar. Nephelite-minette is a new variety of rock belonging to the monchiquite-alnoite series of Rosenbusch. Analcite-basalts occur as dikes in several localities. In one case the rock is estimated to contain 49.5 per cent. of analcite, the remainder being pyroxene, olivine, and magnetite. A rock closely allied to analcite-basalt carries the sapphires mined in this region. The sapphires are considered as having resulted from the absorption of fragments of clay shale included in the magma at the time of its eruption. The fourth group includes basalt, which occurs only in two localities, as extrusive lava.

In the chapter on general petrology of the region it is pointed out that the average composition of all the igneous rocks observed would be that of a moderately acid syenite approaching an acid monzonite in character. The rocks of the larger laccoliths present a somewhat striking similarity in chemical composition and texture. They are generally phanerocrystalline porphyries. They correspond to Rosenbusch's granite porphyritic dike rocks. In this region they are preeminently laccolithic rocks. Their more acidic character must be taken into consideration in this connection, for in other regions less acid rocks occurring in the form of laccoliths exhibit typical granular, nonporphyritic texture. Here, as in other mountain groups of laccolithic character in the Rocky Mountain region, the depths at which the magmas are intruded appear to have exerted no perceptible influence on their granularity. It is evident that chemical composition is an important factor in the production of rock textures.

Differentiation of igneous magmas and the formation of aplitic veins are discussed and the variation in the mineral composition of the rocks at Yogo Peak is expressed diagrammatically. The application of diagrammatic methods to the discussion of chemical variations among rocks of one district is considered with special reference to Yogo Peak and the surrounding region. A comparatively simple mathematical relationship is made out for the principal rocks of the region, which is the more surprising when the intricate nature of the chemical molecules of several of the rock-making minerals is considered. It is perfectly evident, as an abstract proposition, that the chemical composition of any rock is a mathematical function of the several component minerals, whose chemical molecules are more or less variable functions of a few chemical elements. From which it may be inferred that whatever the process by which differentiation of a magma takes place the resulting solutions or magmas will probably sustain a mathematically intricate functional relation to one another. In the present instance the approximate relations appear to be comparatively simple. It is to be noted, however, that the correspondences between observed and estimated composition presented by Professor Pirsson, as he himself remarks, are merely close approximations. They are, nevertheless, striking. With regard to the absorption of sediments by magmas, the study of the igneous rocks in the Little Belt

Mountains shows that there is no evidence in this region in favor of the theory of considerable absorption.

J. P. I.

Geological Survey of Canada. Annual Report of Mineral Statistics for 1898. By E. D. INGALL, Ottawa, 1890. 196 pp.

This report shows an increase of total production for the year covered of 34.89 per cent., a production per capita of $7.32. This is compared with a total increase for the United States of 10.61 per cent., and a per capita production of $9.38, the source of the latter statistics not being given. Compared with previous years, there is a steady and large increase. From a table of proportionate values it appears that gold produces more than one-third (35.63 per cent.) of the whole, leaving coal (21.27 per cent.) well in the rear, while the next on the list are silver (6.71 per cent.) and copper (5.52 per cent.) In the preceding year coal had stood at the head of the list, the change of places being due to the large output of gold from the Yukon.

The total estimated value of metallic and non-metallic products is $38,661,000. The numerous tables usually give the production for several years previous, and afford the means for comparative studies.

C.

On the Subdivisions of the Carboniferous System in Eastern Canada, with Special Reference to the Union and Riversdale Formations of Nova Scotia, Referred to the Devonian System by Some Canadian Geologists. By H. M. AMI, Trans. N. S. Inst. Sci., Vol. X, Session 1899–1900, 17 pp.

The precise scope of the paper is well indicated in the title. The argument proceeds essentially on paleontological lines, and the physical lines of evidence are essentially set aside. In this case these latter embrace unconformities as well as the character of the rocks. The paleontologic evidence embraces plants, crustaceans, insects, mollusks, and amphibia. These are thought to indicate an Eo-Carboniferous age for the Union and Riversdale formations, which have been referred by some Canadian geologists to the Devonian system. The